Intellectual Ventures II LLC v. Sprint Spectrum L.P., et al.

Defendants' Claim Construction Arguments

November 1, 2018

Introduction

U.S. Patent Nos. 8,682,357, 9,532,330, 9,320,018, 9,681,466, 8,897,828, & 8,953,641

“the message having an allocation of resources for a shared channel and a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE”

The ’357 Patent: Claims 11, 30 and 47

The Message Has Two Things: Allocated Resources for a Shared Channel and an Allocated RNTI

"the message **having** an allocation of resources for a shared channel **and** a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE" ('357 Patent Claims 11, 30, & 47)

Defendants' Construction	IV's Construction
"the message **having** an allocation of resources for a shared channel **and an allocation** of a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE"	"Plain and ordinary meaning, the message **conveying** an allocation of resources for a shared channel **and conveying** a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE"

Dispute(s):

1. Whether IV can rewrite the claims to replace the plain term "having" with "conveying"
2. Whether the phrase "an allocation of" modifies both "resources for a shared channel **and** a radio network temporary identity," or only modifies the "resources for a shared channel"

IV Has No Justification for Rewriting and Replacing the Plain Term "having"

- IV replaces "having" in the claim with "conveying," arguing that "there is no difference in meaning."
- But IV concedes that "conveying" can mean **"transmitting"**

> There is no difference in meaning, although the specification often uses the term "convey" when describing the transmission of information from the RAN (or base station) to user equipment.

IV Opening Brief at p. 6

IV Has No Justification for Rewriting and Replacing the Plain Term "having"

- The claim explicitly recites **"sending"** the message
- Separate from reciting "the **message having**" particular required contents
- "having" does not mean sending, or "conveying"

11. A method performed by a wireless network, the method comprising:

sending, by a first network device, a paging signal to a second network device;

paging, by the second network device, a user equipment (UE) in idle mode by sending a message on a control channel, the message having an allocation of resources for a shared channel and a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE;

sending, by the second network device, a paging message in the allocated resources for the shared channel; and

wherein the paging message includes an International Mobile Subscriber Identity (IMSI) or a Temporary Mobile Subscriber Identity (TMSI).

'357 Patent Claim 11

Intrinsic Evidence Confirms that RNTIs Are Allocated

- Issue #2: Does "allocation of" modify only "resources for a shared channel" or does it also modify "a radio network temporary identity (RNTI) . . ."

11. A method performed by a wireless network, the method comprising:

sending, by a first network device, a paging signal to a second network device;

paging, by the second network device, a user equipment (UE) in idle mode by sending a message on a control channel, the message having an allocation of resources for a shared channel and a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE;

sending, by the second network device, a paging message in the allocated resources for the shared channel; and

wherein the paging message includes an International Mobile Subscriber Identity (IMSI) or a Temporary Mobile Subscriber Identity (TMSI).

'357 Patent Claim 11

Intrinsic Evidence Confirms that RNTIs Are Allocated

- The alleged problem: UE's in idle mode do not have an allocated RNTI and do not have any allocated shared channel resources

> Idle state UEs are not known at the cell level because they are generally not connected to the RAN. Therefore, the UE would not have a c-RNTI or SCCH specified for its use in shared channel operation. However, the level of connection to

'357 Patent at 8:7-10

- The alleged solution: use a paging message to allocate an RNTI and shared channel resources to the UE to facilitate fast connection to the network

> Node B over a shared channel. The UE uses the c-RNTI and the SCCH index, which are signalled with the paging message to identify the UE and the SCCH, respectively, during shared channel operations. The Node B conveys the paging

'357 Patent at 7:26-29

Intrinsic Evidence Confirms that RNTIs Are Allocated

- IV misinforms the Court that "[t]here is no support in the specification for sending 'an allocation of RNTI'"

IV Op. Br. at p. 7

- The specification describes that both RNTIs and resources on the shared channel are allocated and sent in a message to the UE

Node B over a shared channel. The UE uses the c-RNTI and the SCCH index, which are signalled with the paging message to identify the UE and the SCCH, respectively, during shared channel operations. The Node B conveys the paging acknowledgment from the UE to the Core network. This completes the connection between the UE and the network.

SCCH and c-RNTI Management

One way to manage the allocation of c-RNTI and SCCH is to allow the Node Bs to select c-RNTIs and SCCHs. After receiving a paging request from the aGW, the Node B may select an unused c-RNTI and one or a set of SCCHs to be used by the UE, if, e.g., the UE is in the idle state. During idle

'357 Patent at 7:26-37

Intrinsic Evidence Confirms that RNTIs Are Allocated

- IV misinforms the Court that "[t]here is no support in the specification for sending 'an allocation of RNTI'"

IV Op. Br. at p. 7

- The specification describes that both RNTIs and resources on the shared channel are allocated and sent in a message to the UE

> When the RRM is employed, it takes over the function of assigning c-RNTI and SCCHs. (The aGW, in one embodiment, still sends the paging message.) The RRM server reserves a set of temporary identifiers and SCCHs. The RRM selects, allocates and keeps track of the assignment of temporary identifiers and SCCHs to paging messages. The RRM

'357 Patent at 7:63-8:1

IV's Discovery Responses Support Defendants' Construction

IV relies on the **same** disclosures in its Interrogatory Response asking for identification of written description support for this term

To address this issue, the '357 Patent proposes allocating a radio network temporary identity (RNTI) and shared channel resources to a UE. *See, e.g., id. at* 7:33-37 ("One way to manage the *allocation of c-RNTI and SCCH* is to allow the Node Bs to *select c-RNTIs and SCCHs*. After receiving a paging request from the aGW, the Node B may *select an unused c-RNTI and one or a set of SCCHs* to be used by the UE, if, e.g., the UE is in the idle state."). The allocated RNTI and shared channel resources can then be signaled to the UE as part of the paging process, so that the paging operation results in the UE being able to connect with the network using its allocated RNTI and allocated shared channel resources. *Id.* at 5:10-15; 5:25-34; 3:2-10.

Defendants' Brief at p. 4

"Idle state UEs are not known at the cell level because they are generally not connected to the RAN. Therefore, the UE would not have a c-RNTI or SCCH specified for its use in shared channel operation. . . . With this limited connection, however, the UE does not have *c-RNTI, SCCH or radio resources* ***allocated***." *Id.* at 8:7-19.

Defendants' Brief at p. 5

INTERROGATORY NO. 1:

Provide on a claim element-by-element basis a specific identification of all portions of the corresponding patent specification, and any provisional or non-provisional patent application to which IV maintains a claim of priority, that IV contends provides written description support under 35 U.S.C. § 112 for any Asserted Claim of each of the Asserted Patents.

[B] "paging, by the network device, a user equipment (UE) in idle mode by sending a message on a control channel, the message having an allocation of resources for a shared channel and a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE"	30	'357 Patent comprising the Abstract, Background, Summary, Specification and claims, including but not limited to Figures 1-16, 2:45-49, 2:56-3:18, 3:21-29, 3:34-48, 3:56-64, 4:4-11, 4:35-39, 4:62-5:3, 5:5-15, 5:18-19, 5:23-34, 5:44-48, 5:65-6:67, 7:8-11, 7:19-21, 7:26-29, 7:32-42, 7:47-62, 8:1-22, 8:37-42, 8:51-53, 8:55-60, 9:27-10:35, 10:41-47, 10:52-11:5, 11:13-44, and claims 1, 3, 7, 11, 13, 16, 17, 21, 23, 27, 30, 32, 35, 36, 39, 41, 44, 45, 47, 49, 52, 53. In addition, the entire specification and the knowledge of a person of ordinary skill in the art provide general support.

IV's Resp. to Ericsson's Interrogatory No. 1 at p.11

IV's Reliance on Figures 14-16 is Misplaced

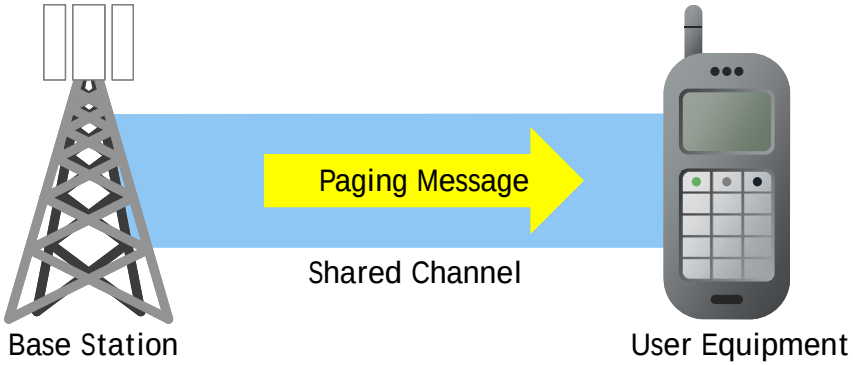
- IV's Reply relies on Figures 14-16 as allegedly showing that only an allocation of resources is disclosed, and not an allocation of an identifier.

- IV carefully chooses its words:
  - An "allocation of resources"
  - Not "allocation of resources for a shared channel" (as claimed)
  - And not a "shared channel" on which the network sends a paging message (as claimed)

> In fact, the specification often discusses transmitting an identifier and an allocation of resources, ***in that order***, suggesting the patentee simply reversed their sequence when drafting the asserted claims. *See, e.g.*,`357 Patent, Fig. 14 at 202 ("send the…message together ***with a temporary identifier and an indication of an allocation of dedicated physical access resource***"); Fig. 15 at 302, Fig. 16 at 401, 10:15-21, 10:22-28. If the patentee intended Defendants'

IV Reply Brief at p. 2

IV's Reliance on Figures 14-16 is Misplaced



- The allocated resources must be for a "shared channel"
- The "shared channel" must be a downlink channel – one that carries a paging message <u>from</u> the network device <u>to</u> the UE

11. A method performed by a wireless network, the method comprising:

sending, by a first network device, a paging signal to a second network device;

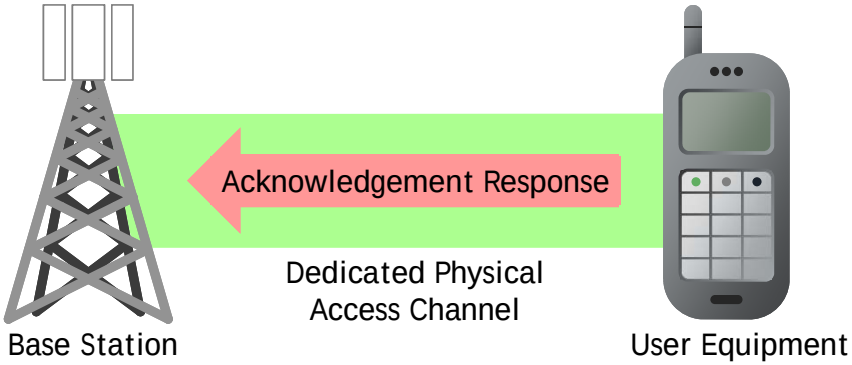
paging, by the second network device, a user equipment (UE) in idle mode by sending a message on a control channel, the message having an allocation of resources for a shared channel and a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE;

sending, by the second network device, a paging message in the allocated resources for the shared channel; and

wherein the paging message includes an International Mobile Subscriber Identity (IMSI) or a Temporary Mobile Subscriber Identity (TMSI).

'357 Patent Claim 11

IV's Reliance on Figures 14-16 is Misplaced



- IV relies on allocation of resources on **a dedicated physical access channel**, which is **not a shared channel**

- The allocated resources in Figure 14 are **uplink resources** and, therefore, **cannot carry a downlink paging message**

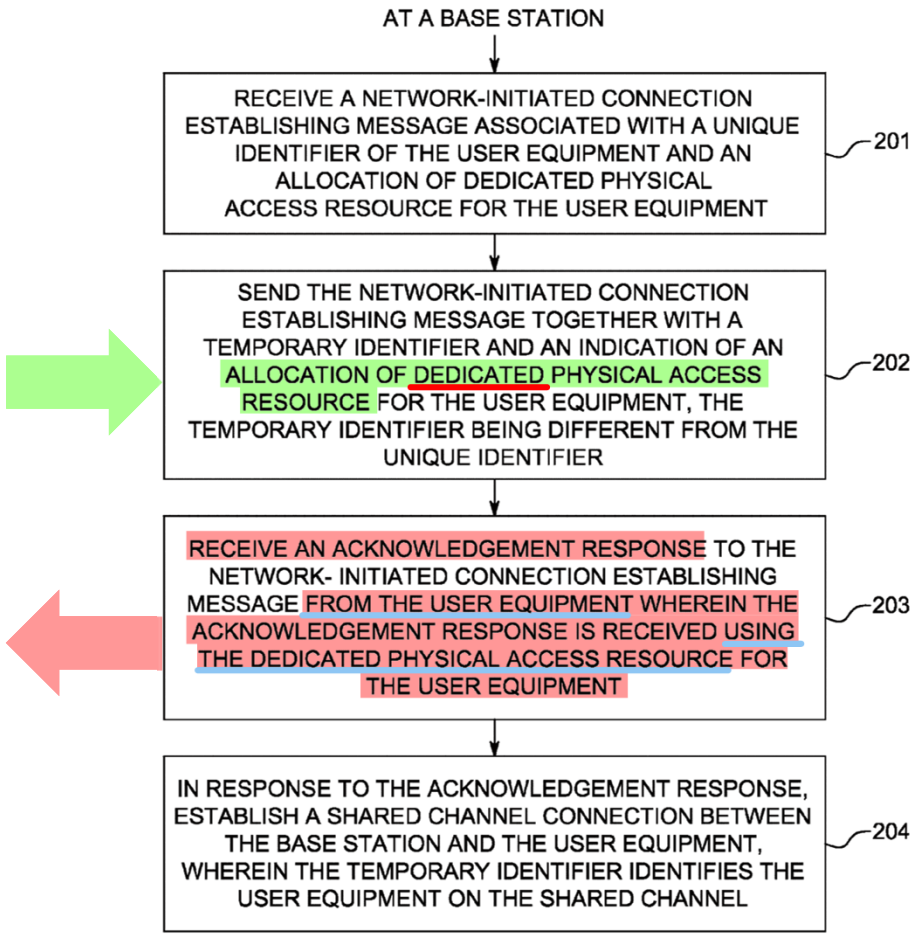


FIG. 14

'357 Patent Figure 14

The Message Has Two Things: An Allocated RNTI and Allocated Resources for a Shared Channel

- "the message having an allocation of resources for a shared channel and a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE"

'357 Patent Claims 11, 30, & 47

The Correct Construction

"the message having an allocation of resources for a shared channel and an allocation of a radio network temporary identity (RNTI) associated with a plurality of UEs including the UE"

- Supported by the plain claim language
- Supported by every description of a message having an RNTI

“the signal”

The ’330 Patent: Claims 1, 8, 9, 17, 18, 25, 26, and 34

"The Signal" Term of the '330 Patent

"the signal" (Claims 1, 8, 9, 17, 18, 25, 26, & 34 of '330 Patent)

Defendants' Construction	IV's Construction
For claims 1, 8, 18, 25: "the signal that (1) indicates a page of the UE and (2) includes an indication of the shared channel for the UE to receive" For claims 9, 17, 26, 34: "the signal that (1) indicates a page from a network device and (2) includes an indication of the shared channel"	For claims 1, 8, 18, 25: "Plain and ordinary meaning, the signal to indicate a page of the UE" For claims 9, 17, 26, 34: "Plain and ordinary meaning, the signal to indicate a page from the network device"

Agreement:

- The parties agree that "the signal" has an antecedent basis. *See* IV Op. Br. at 9.

Dispute(s):

- Whether the phrase "the signal" includes both attributes: recited in the antecedent term "a signal".

The Claimed "Signal" Includes Two Attributes, Not Just One as IV Contends

- IV agrees "a signal" is antecedent for "the signal"
- "a signal" has two attributes
- IV's proposed construction ("the signal to indicate a page of the UE") improperly seeks to eliminate the second attribute from "the signal"

1. A network device comprising:
circuitry configured to receive, from a core network, a paging message related to a user equipment (UE);
a processor configured to send, on a control channel in a long-term evolution (LTE) network in response to reception of the paging message, a signal to indicate a page of the UE and the signal includes an indication of a shared channel for the UE to receive;
wherein the signal is derived from a radio network temporary-identifier (RNTI); and
the processor further configured to send a transmission to the UE on the indicated shared channel.

'330 Patent Claim 1

“wherein allocation of resources for the data of each channel having a second parameter above zero is provided prior to another channel’s data for transmission having a third parameter less than or equal to zero”

The ’466 Patent: Claims 4 and 9; the ’018 Patent: Claims 12, 16, and 20, and similar terms in ’466 Patent Claims 1 and 9 and ’018 Patent Claim 24

This Term Requires Construction

- When isolating the relevant nouns it's clear the term is missing a verb or noun in at least one of the two clauses separated by the preposition "before" (or "prior to"):

> the allocation message, wherein allocation of resources for the data of each channel having a second parameter above zero is provided prior to another channel's data for transmission having a third parameter less than or equal to zero;

'466 Patent Claim 4

Claim Construction

"wherein allocation of resources for the data of each channel having a second parameter above zero is provided prior to another channel's data for transmission having a third parameter less than or equal to zero" ('466 Patent: Claims 4 and 9; '018 Patent: Claims 12, 16, and 20, and similar terms in '466 Patent Claims 1 and 9 and '018 Patent Claim 24)

Defendants' Construction	IV's Construction
"wherein allocation of resources for the data of each channel of a radio bearer having a second parameter above zero must be provided for transmission of that data before another channel's data having a third parameter less than or equal to zero," or alternatively, indefinite Sprint's and T-Mobile's construction for Claims 1 and 6 of the '466 Patent and Claim 24 of the '018: "wherein resources must be allocated such that transmission of the data of each channel [of a radio bearer] having a second parameter above zero takes place before transmission of data of another channel [of a radio bearer] having a third parameter less than or equal to zero," or alternatively, indefinite	"Plain and ordinary meaning, wherein allocation of resources for the data of each channel of a radio bearer having a second parameter above zero is provided before the allocation for another channel's data for transmission having a third parameter less than or equal to zero"

Dispute:

- Whether the claimed positive channels must be transmitted before the claimed non-positive channels.

IV's Construction is Incorrect

IV's Construction

"wherein allocation of resources for the data of each channel of a radio bearer having a second parameter above zero is provided before the allocation for another channel's data for transmission having a third parameter less than or equal to zero"

1. IV's construction permits allocation to channels with non-positive parameters in direct conflict with the specification.
2. IV's construction misreads "for transmission".

The Specification Prohibits Allocation to Non-Positive Parameters

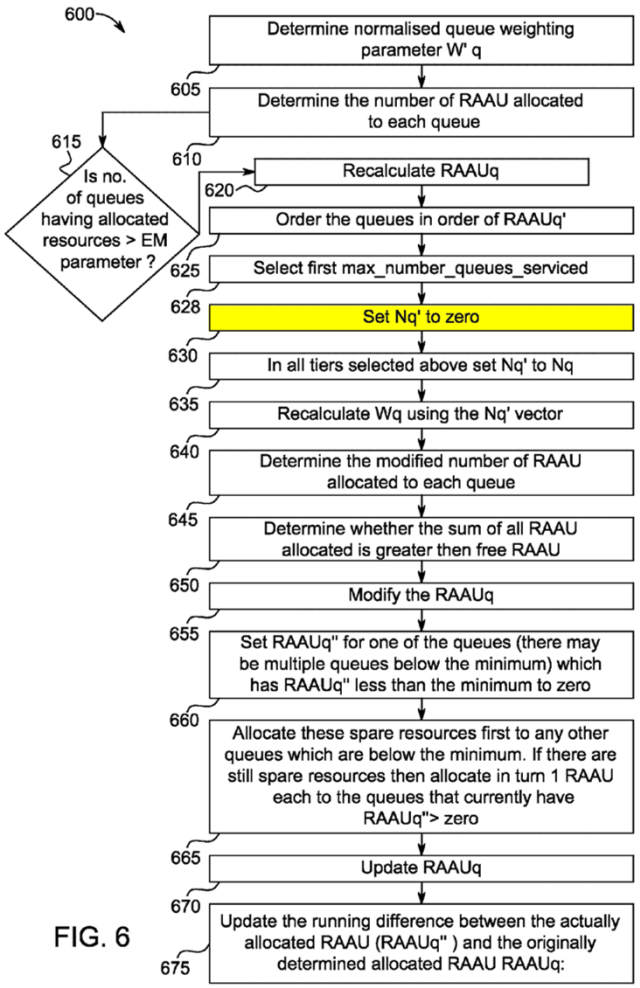


FIG. 6

- The patents contain exactly one embodiment where a parameter is identified as taking a "zero" value:

> In all queues not selected in step **628**, the Nq' value is set to zero, as shown in step **630**. In all of the tiers that were selected in step **628**, Nq' is set to Nq, as shown in step **635**.

'466 Patent at 11:43-45; Figure 6

The Specification Prohibits Allocation to Non-Positive Parameters

In step **640**, Wq (now known as W''_q) may be re-calculated using the Nq' vector determined in step **635**, for example using:

$$W''_q = \frac{N'_q * S_q}{\sum_{q=0}^{NB\_q-1} (N'_q * S_q)}$$

The modified number of RAAU, allocated to each queue, may then be determined in step **645**. For example, the modified number may be determined using:

$$RAAUq'' = \text{round}(\text{FreeRAAU} * W''q)$$

'466 Patent at 11:46-60

IV's Construction Misreads "For Transmission"

- IV argues that "for transmission" distinguishes that data from other data that is "not for transmission," such as first and third parameters for the channel

> parameter. In specifying the relative priority of allocation of resources, the system considers only data from the "another channel" that is "for transmission," as opposed to data from the "another channel" that is ***not*** for transmission such as the channel's first parameter, its third parameter, or any of the "another channel's" other pieces of data from the Figure 6 embodiment (e.g., W'_q , W''_q , N_q , N'_q , S_q , $RAAU_q$, $RAAU_q'$, $RAAU_q''$) which are not "for transmission." *See* `018 Patent at 10:45–12:14.

IV Reply Br. at p. 5

- But this contradicts the rest of the claim language

IV's Construction Misreads "For Transmission"

"wherein allocation of resources for the data of each channel having a second parameter above zero is provided prior to another channel's data for transmission having a third parameter less than or equal to zero"

'466 Patent Claim 4

- IV's argument leads to intentionally wasted resources because it reads the claim to require allocation to data (for the above zero channels) that is not going to be transmitted.

Trusted Knight

"A district court can only correct a patent, however, if: '(1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims.'"

Trusted Knight Corp. v. International Business Machines Corp., 681 Fed. Appx. 898, 903 (Fed. Cir. 2017) (citing *Novo Indus. v. Micro Molds Corp.*, 350 F.3d 1348, 1357 (Fed. Cir. 2003))

Trusted Knight Versus Claim at Issue

Trusted Knight	Claim at Issue
"a process of passing the encrypted data to a 3-ring level where a hook inserted by a hook-based key logger."	"wherein allocation of resources for the data of each channel having a second parameter above zero is provided prior to another channel's data for transmission having a third parameter less than or equal to zero"
Plaintiff suggested the claim was meant to be read with "is" in the limitation, so that it would read	IV suggests the claim is meant to be read with another "allocation" in the limitation, so that it reads
"a process of passing the encrypted data to a 3-ring level where a hook **is** inserted by a hook-based key logger."	"wherein allocation of resources for the data of each channel of a radio bearer having a second parameter above zero is provided before **the allocation** for another channel's data for transmission having a third parameter less than or equal to zero"

“the single physical channel”

The ’828 Patent: Claims 1, 8, 15, 22, 29, 36

"the single physical channel"

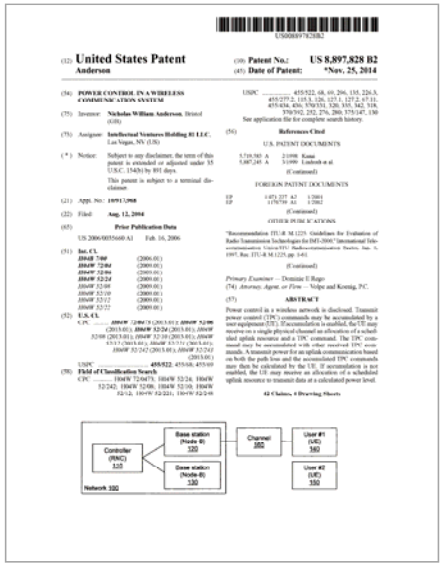
"the single physical channel" (Claims 1, 8, 15, 22, 29, 36)

Defendants' Construction	IV's Construction
Claims 1 and 15: "the same physical channel on which the UE receives the allocation of a scheduled uplink resource and a TPC command" Claims 8 and 22: "the same physical channel on which the circuitry is configured to receive the allocation of a scheduled uplink resource and a TPC command" Claim 29: "the same physical channel on which the network device sends the allocation of a scheduled uplink resource and a TPC command" Claim 36: "the same physical channel on which the circuitry is configured to send the allocation a scheduled uplink resource and a TPC command"	"Plain and ordinary meaning, a channel capable of carrying an allocation of a scheduled uplink resource and a TPC command"

Dispute(s):

- Whether the antecedent basis doctrine requires using the antecedent, previously defined single physical channel or allows any physical channel with similar characteristics

"the single physical channel"



United States Patent
Anderson

(10) Patent No.: US 8,897,828 B2
(45) Date of Patent: *Nov. 25, 2014

(54) POWER CONTROL IN A WIRELESS COMMUNICATION SYSTEM

(75) Inventor: Nicholas William Anderson, Bristol (GB)

(73) Assignee: Intellectual Ventures Holding 81 LLC, Las Vegas, NV (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 891 days.

This patent is subject to a terminal disclaimer

(21) Appl. No.: 10/971,968

(22) Filed: Aug. 12, 2004

(65) Prior Publication Data

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H04W 72/04 (2009.01)
H04W 52/04 (2009.01)
H04W 52/24 (2009.01)
H04W 52/08 (2009.01)
H04W 52/10 (2009.01)
H04W 52/12 (2009.01)
H04W 52/22 (2009.01)

(52) U.S. Cl.
CPC H04W 72/04 (2013.01); H04W 52/08 (2013.01); H04W 52/24 (2013.01); H04W 52/08 (2013.01); H04W 52/10 (2013.01); H04W 52/12 (2013.01); H04W 52/22 (2013.01); H04W 52/242 (2013.01); H04W 52/243 (2013.01)
USPC 455/522; 455/68; 455/69

(58) Field of Classification Search
CPC H04W 72/0473; H04W 52/24; H04W 52/242; H04W 52/08; H04W 52/10; H04W 52/12; H04W 52/221; H04W 52/248
See application file for complete search history.

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(Continued)

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(57) ABSTRACT

Power control in a wireless network is disclosed. Transmit power control (TPC) commands may be accumulated by a user equipment (UE). If accumulation is enabled, the UE may receive on a single physical channel an allocation of a scheduled uplink resource and a TPC command. The TPC command may be accumulated with other received TPC commands. A transmit power for an uplink communication based on both the path loss and the accumulated TPC commands may then be calculated by the UE. If accumulation is not enabled, the UE may receive an allocation of a scheduled uplink resource to transmit data at a calculated power level.

42 Claims, 4 Drawing Sheets

1. A method performed by user equipment (UE), the method comprising:

receiving, by the UE, an indication of whether accumulation of transmit power control (TPC) commands is enabled;

determining, by the UE, a path loss of a downlink channel;

receiving, on a single physical channel by the UE if accumulation is enabled, an allocation of a scheduled uplink resource and a TPC command, wherein the TPC command is accumulated with other received TPC commands;

calculating, by the UE if accumulation is enabled, transmit power in association with an uplink communication based on both the path loss and the accumulated TPC commands; and

receiving, on the single physical channel by the UE if accumulation is not enabled, an allocation of a scheduled uplink resource to transmit data at a power level calculated by the UE based on the path loss.

'828 Patent Claim 1

Case Law on Antecedent Basis

"The statute recites 'a drug ... *the* use of which is claimed,' not 'a drug ... *a* use of which is claimed,' or 'a drug ... *any* use of which is claimed,' or 'a drug *having a use* which is claimed.'

. . .

The words 'the use' require antecedent basis; thus, 'the use' refers to a specific 'use' rather than a previously undefined 'use.'"

Warner-Lambert Co. v. Apotex Corp., 316 F.3d 1348, 1356 (Fed. Cir. 2003)

Case Law on Antecedent Basis

"A claim term should be construed consistently with its appearance in other places in the same claim or in other claims of the same patent."

Rexnord Corp. v. Laitram Corp., 274 F.3d 1336, 1342 (Fed. Cir. 2001)

IV's Red Herring Argument

- IV's argument:

> "However, the patent specification is clear that these two modes are never active at the same time, and so while the 'single physical channel' can be used in either mode, that physical channel would not be the 'same' in terms of the time or mode in which it is used."

Opening Br. at p. 18

- Defendants' position:

> Claims 1 and 15: the same physical channel on which the UE receives the allocation of a scheduled uplink resource and a TPC command if accumulation is enabled

“[receiving/receive/sending/send] . . . if accumulation is not enabled, an allocation of a scheduled uplink resource to transmit data [to the wireless network/network device] at a power level calculated by the UE based on the path loss”

The ’828 Patent: Claims 1, 8, 15, 22, 29, and 36

Claim Construction

"[receiving/receive/sending/send] . . . if accumulation is not enabled, an allocation of a scheduled uplink resource to transmit data [to the wireless network/network device] at a power level calculated by the UE based on the path loss" (Claims 1, 8, 15, 22, 29, and 36 of '828 Patent)

Defendants' Construction	IV's Construction
Plain and Ordinary Meaning; "[receiving/receive/sending] . . . If accumulation is not enabled an allocation of a scheduled uplink resource to transmit data to the wireless network at a power level calculated by the UE based on the path loss and without using a TPC command"	"Plain and ordinary meaning, (no negative limitation required)"

Dispute:

- Whether the claims require a distinction between when accumulation is enabled and when accumulation is not enabled.

Merck & Co.

"A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so."

Merck & Co., Inc. v. Teva Pharma. USA, Inc., 395 F.3d 1364, 1372 (Fed. Cir. 2005)

The Claims Support Defendants' Construction

	Accumulation Is Enabled	Accumulation Is Not Enabled
What is received by the UE?	• An allocation of a scheduled uplink resource • A TPC Command	• An allocation of a scheduled uplink resource
How is the power level calculated by the UE?	• Based on both the path loss and the accumulated TPC commands	• Based on the path loss

1. A method performed by user equipment (UE), the method comprising:

receiving, by the UE, an indication of whether accumulation of transmit power control (TPC) commands is enabled;

determining, by the UE, a path loss of a downlink channel;

receiving, on a single physical channel by the UE if accumulation is enabled, an allocation of a scheduled uplink resource and a TPC command, wherein the TPC command is accumulated with other received TPC commands;

calculating, by the UE if accumulation is enabled, transmit power in association with an uplink communication based on both the path loss and the accumulated TPC commands; and

receiving, on the single physical channel by the UE if accumulation is not enabled, an allocation of a scheduled uplink resource to transmit data at a power level calculated by the UE based on the path loss.

The Specification Supports Defendants' Construction

- When accumulation is not enabled, a TPC command is not received, and transmit power is based on path loss without a TPC command.

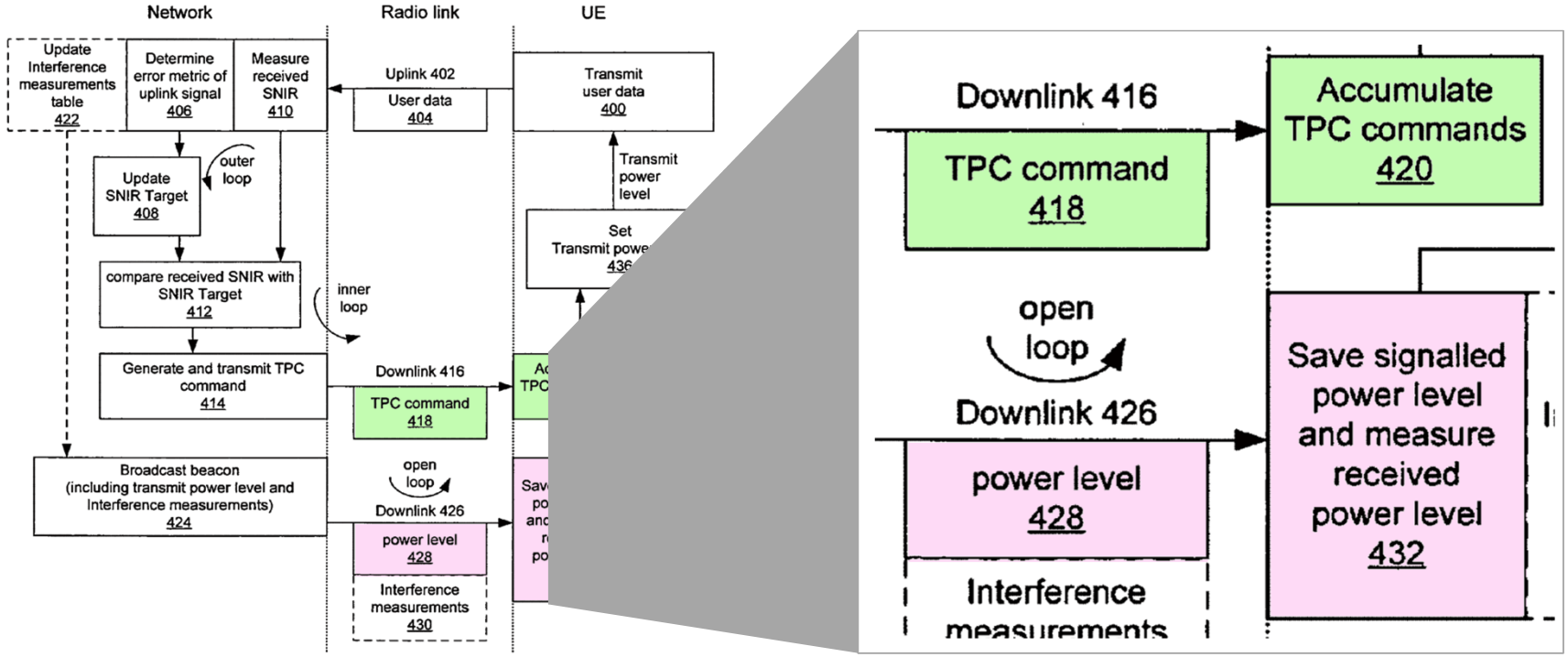

FIGURE 4

IV Concedes that It is Reading Both Modes of Operation the Same Way

contend. *See* Defs.' Br. at 19. Rather, the '828 patent contemplates using TPC commands in both modes. '828 Patent at Abstract, Figs. 3-4, 7:16-19, 8:66-9:15, 9:55-10:14, 11:19-25,13:37-55. TPC commands are processed differently in the two modes. *Id.* When "accumulation is enabled," the UE accumulates values carried by multiple TPC commands, and adjusts the power by the accumulated sum. *Id.* When "accumulation is not enabled," the UE does not accumulate TPC values, and simply adjusts its power by the latest TPC value. *Id.* Because the patent specification

IV Reply Br. at p. 6-7

IV's Reply Brief Misstates the Patent's Disclosure

contend. *See* Defs.' Br. at 19. Rather, the '828 patent contemplates using TPC commands in both modes. '828 Patent at Abstract, Figs. 3-4, 7:16-19, 8:66-9:15, 9:55-10:14, 11:19-25,13:37-55. TPC commands are processed differently in the two modes. *Id.* When "accumulation is enabled," the UE accumulates values carried by multiple TPC commands, and adjusts the power by the accumulated sum. *Id.* When "accumulation is not enabled," the UE does not accumulate TPC values, and simply adjusts its power by the latest TPC value. *Id.* Because the patent specification

IV Reply Br. at p. 6-7

IV's Reply Brief Misstates the Patent's Disclosure

- TPC commands are "step amounts" – they change the power by set amount

control commands from the network to a UE. The commands instruct the UE to increase or decrease its transmitted power by a predetermined step dB amount. Unfortunately, such

'828 Patent at 2:23-25

- If TPC commands are used, they are always accumulated

The feedback indicates either power up or power down. Every time a TPC command is received an integrator in the UE is used within the inner loop to update the UE transmit power by a step amount +/–Δ dB. The TPC commands themselves are

'828 Patent at 6:57-60

IV's Reply Brief Misstates the Patent's Disclosure

- TPC commands are only used when accumulation is enabled

> The history stored in the TPC accumulator may be stale. In some circumstances the history may be considered useful and is not reset. Alternatively, the accumulated TPC history could be used to set the uplink transmit power level but with some excess power margin added to ensure a clean start to the loop. Alternatively, the UE may decide to discard the accumulated TPC history and to reset it to a default or initial value. The default or initial value may optionally be based upon a received interference measurement table **430**.

'828 Patent at 11:19-25

- **There is no disclosure of using TPC commands when accumulation is not enabled**

“transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band”

The ’641 Patent: Claim 1

"transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band"

"transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band" (Claim 1)

Defendants' Construction	IV's Construction
"transmit a broadcast channel, wherein **the entire broadcast channel** is contained within the OFDMA core band and provides essential radio control channels and a set of data channels in the core band to maintain basic radio operation"	"Plain and ordinary meaning, transmitting a broadcast channel, wherein **the entire channel** is contained within an orthogonal frequency division multiple access (OFDMA) core-band"

Dispute(s):

- The meaning of the phrase "the entire broadcast channel"

The PTAB and Federal Circuit have Considered this Term

U.S. Patent 7,787,431

US007787431B2

(12) **United States Patent**
Li et al.

(10) **Patent No.: US 7,787,431 B2**
(45) **Date of Patent: Aug. 31, 2010**

(54) **METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH**

(76) Inventors: **Xiaodong Li**, 9919 129th Pl. NE., Kirkland, WA (US) 98033; **Titus Lo**, 13312 SE. 43rd St., Bellevue, WA (US) 98006; **Kemin Li**, 4228 144th La. SE., Bellevue, WA (US) 98006; **Haiming Huang**, 605 141st Ct. SE. #D203, Bellevue, WA (US) 98007

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 467 days.

(21) Appl. No.: **10/583,534**

(22) PCT Filed: **Apr. 29, 2005**

(86) PCT No.: **PCT/US2005/014828**

§ 371 (c)(1),
(2), (4) Date: **Jun. 5, 2007**

(87) PCT Pub. No.: **WO2005/112566**

PCT Pub. Date: **Dec. 1, 2005**

(65) **Prior Publication Data**

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Related U.S. Application Data

(60) Provisional application No. 60/567,233, filed on May 1, 2004.

(51) **Int. Cl.**
H04J 1/00 (2006.01)

(52) **U.S. Cl.** **370/343**; 370/203; 370/437; 370/468; 370/485; 370/536

(58) **Field of Classification Search** 370/343, 370/408, 485, 536
See application file for complete search history.

(56) **References Cited**

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Yi et al., "Orthogonal multicarrier bandwidth modulation scheme for wireless communications," The 13th IEEE International Symposium on Personal Indoor and Mobile Radio communications, Sep. 2002, vol. 5, pp. 2054-2058.

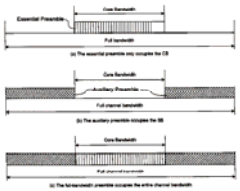
(Continued)

Primary Examiner—Huy D Vu
Assistant Examiner—Maria L. Sekul
(74) *Attorney, Agent, or Firm*—Schwabe, Williamson & Wyatt, P.C.

(57) **ABSTRACT**

Methods and apparatus for multi-carrier communication with variable channel bandwidth are disclosed, where the time frame structure and the OFDM symbol structure are invariant and the frequency-domain signal structure is flexible. In one embodiment, a mobile station, upon entering a geographic area, uses a core-band to initiate communication and obtain essential information and subsequently switches to full operating bandwidth of the area for the remainder of the communication. If the mobile station operates in a wide range of bandwidths, the mobile station divides the full range into sub-ranges and adjusts its sampling frequency and its FFT size in each sub-range.

27 Claims, 10 Drawing Sheets



U.S. Patent 8,953,641

US008953641B2

(12) **United States Patent**
Li et al.

(10) **Patent No.: US 8,953,641 B2**
(45) **Date of Patent: Feb. 10, 2015**

(54) **METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH**

(75) Inventors: **Xiaodong Li**, Kirkland, WA (US); **Titus Lo**, Bellevue, WA (US); **Kemin Li**, Bellevue, WA (US); **Haiming Huang**, Bellevue, WA (US)

(73) Assignee: **Intellectual Ventures II LLC**, Wilmington, DE (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 581 days.

(21) Appl. No.: **12/870,617**

(22) Filed: **Aug. 27, 2010**

(65) **Prior Publication Data**

US 2010/0322119 A1 Dec. 23, 2010

Related U.S. Application Data

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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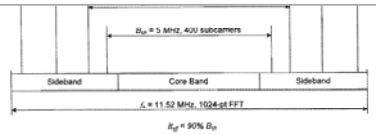
Yi et al., "Orthogonal multicarrier bandwidth modulation scheme for wireless communications," The 13th IEEE International Symposium on Personal Indoor and Mobile Radio communications, Sep. 2002, vol. 5, pp. 2054-2058.

(Continued)

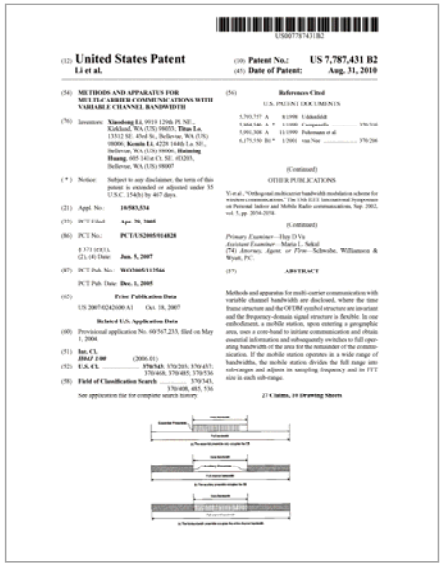
Examiner — Khoa Huynh
Firm — Schwabe, Williamson &



Related U.S. Application Data

Continuation of application No. 10/583,534, filed as application No. PCT/US2005/014828 on Apr. 29, 2005, now Pat. No. 7,787,431.

The PTAB and Federal Circuit have Considered this Term



(12) **United States Patent**
Li et al.

(10) **Patent No.: US 7,787,431 B2**
(45) **Date of Patent: Aug. 31, 2010**

(54) METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

(75) Inventors: Xiaodong Li, 9919 120th Pl NE, Kirkland, WA (US) 98033; Titus Lo, 13312 SE 43rd St., Bellevue, WA (US) 98006; Kemin Li, 4228 144th Ln SE, Bellevue, WA (US) 98006; Huiming Huang, 605 141st Ct. SE #3203, Bellevue, WA (US) 98007

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 467 days.

(21) Appl. No.: 10/583,534

(22) PCT Filed: Apr. 30, 2004

(86) PCT No.: PCT/US2005/014828

§ 371 (c)(1),
(2), (4) Date: Jun. 5, 2007

(87) PCT Pub. No.: WO2006/115566

PCT Pub. Date: Dec. 1, 2005

(65) Prior Publication Data

US 2007/0242600 A1 Oct. 18, 2007

Related U.S. Application Data

(60) Provisional application No. 60/567,233, filed on May 1, 2004

(51) Int. Cl.
H04J 1/00 (2006.01)

(52) U.S. Cl. 370/343; 370/203; 370/437; 370/468; 370/485; 370/536

(58) Field of Classification Search 370/343, 370/408, 485, 536

See application file for complete search history.

(56) References Cited

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6,175,550 B1 * 1/2001 van Nee 370/206

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OTHER PUBLICATIONS

Yi et al., "Orthogonal multicarrier bandwidth modulation scheme for wireless communications," The 13th IEEE International Symposium on Personal Indoor and Mobile Radio communications, Sep. 2002, vol. 5, pp. 2054-2058.

(Continued)

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Assistant Examiner—Maria L. Sakul
(74) *Attorney, Agent, or Firm*—Schwabe, Williamson & Wyatt, P.C.

(57) ABSTRACT

Methods and apparatus for multi-carrier communication with variable channel bandwidth are disclosed, where the time frame structure and the OFDM symbol structure are invariant and the frequency-domain signal structure is flexible. In one embodiment, a mobile station, upon entering a geographic area, uses a core-band to initiate communication and obtain essential information and subsequently switches to full operating bandwidth or the area for the remainder of the communication. If the mobile station operates in a wide range of bandwidths, the mobile station divides the full range into subranges and adjusts its sampling frequency and its FFT size in each sub-range.

27 Claims, 10 Drawing Sheets

8. A cellular base station comprising:

circuitry configured to transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band,

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation creak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties; and

circuitry configured to transmit control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

Ex. F to Dkt. 194, '431 Patent Claim 8

IV Misrepresents that its Construction is "the Plain and Ordinary Meaning"

- In construing the identical claim phrase "transmit a broadcast channel in an OFDMA core band," the PTAB initially determined:

> "on this record, we determine **the plain meaning of transmitting a broadcast channel in a core-band merely requires transmitting some part of the broadcast channel in a core band** and does not exclude transmitting another part of the broadcast channel outside the core-band"

Ex. C to Dkt. 194, IPR2015-01664, Institution Decision at p. 11

The PTAB and the Federal Circuit Adopted a More Narrow Construction, Based on IV's Arguments

- IV argued, and the PTAB and Federal Circuit ultimately agreed, that this claim phrase, on this record, has a more narrow meaning: requiring that the *entire* broadcast channel must be contained *within* the core band

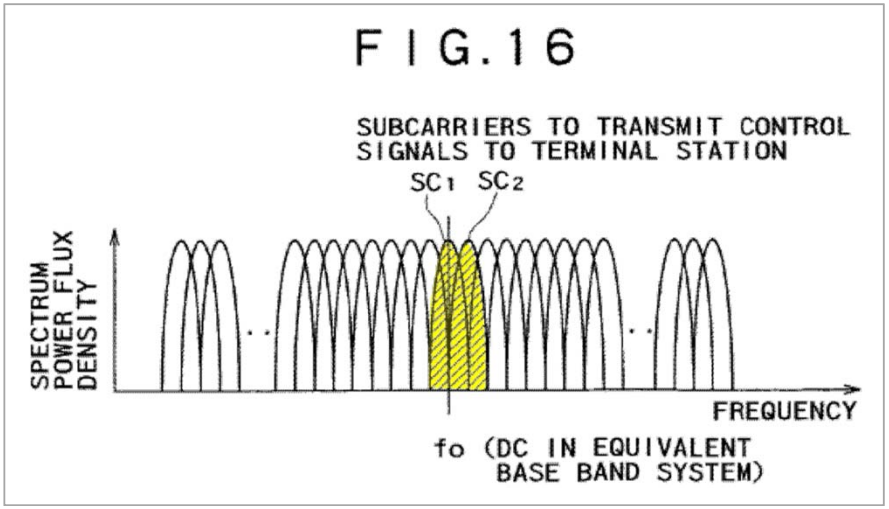
> "We agree with Patent Owner that to show that the transmitting "a broadcast channel in an OFDMA core-band limitation is met, Petitioner must demonstrate that the prior art teaches or suggests **transmitting a broadcast channel, wherein the entire channel is contained within the core-band**."

Ex. D to Dkt. 194, IPR2015-01664, Final Written Decision at pp. 8-9.

- Defendants' construction explains the meaning of the "entire broadcast channel" using IV's own words, while IV's construction ignores the issue

Defendants' Construction Comes from IV's Own Words

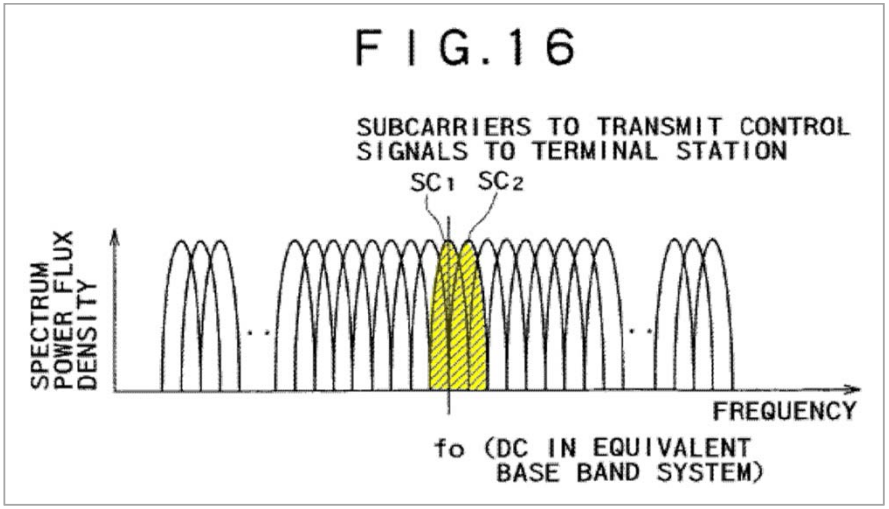
- In an IPR of the parent to the '641 patent (with an identical disclosure and the identical claim term at issue), the PTAB relied on a prior art reference to *Yamaura*



- *Yamaura* disclosed an OFDMA core-band (subcarriers SC_1 and SC_2)
- It was undisputed that *Yamaura* disclosed broadcasting certain control signals *only* within the core-band (SC_1 and SC_2) (Ex. E at 30; Ex. D at 13)
- That disclosure met the PTAB's view of the ordinary meaning of "transmitting a broadcast channel in a core-band"

Defendants' Construction Comes from IV's Own Words

- IV argued that a prior art reference, "*Yamaura,*" did not disclose transmitting a broadcast channel in the core band, because Yamaura also disclosed broadcasting other signals outside of the core-band



"[t]ransmitting part of the BCH in subcarriers SC1 and SC2 and the remaining part of the BCH in the other 51 subcarriers does not constitute 'transmitting a broadcast channel in [a] core-band.'"

Ex. E to Dkt. 194, IPR2015-01664, Patent Owner Response at 31.

Defendants' Construction Comes from IV's Own Words

- IV relied on the stated "purpose" of the patent to overcome prior art:

> "the Board's preliminary construction contemplates transmitting part of a broadcast channel in a core-band and part of a broadcast channel in a side-band (outside of the core-band). **Such a construction contradicts** the plain language of the claims as well as **the stated purpose of the '431 patent** as understood by a person of ordinary skill in the art."

Ex. E to Dkt. 194, IPR2015-01664, Patent Owner Response at 35

> "**The claims should be construed in light of the specification** of the '431 Patent, not in light of Yamaura. The '431 Patent explains that **the purpose of transmitting a broadcast channel in a core-band** is to **provide essential radio control channels and a set of data channels in a core-band to maintain basic radio operation. Ex. 1001 at 5:8-13."**

Id. at 36

Defendants' Construction Comes from IV's Own Words

- The PTAB accepted IV's construction based on IV's arguments regarding the purpose of transmitting a broadcast channel in the core-band:

"**Patent Owner explains the purpose** of transmitting the broadcast channel in the 'core-band **is to provide essential radio control channels and a set of data channels in a core-band to maintain basic radio operation**.' Id. at 36 (citing Ex. 1001, 5:8–13)."

"Dr. Zeger further states that a construction encompassing transmission of part of a broadcast channel in the core-band and part of the broadcast channel outside the core-band is inconsistent with the plain language of the claims and the purpose of the '431 patent. . . . **Dr. Zeger testifies that the purpose of the '431 patent would therefore be frustrated if part of the broadcast channel is transmitted outside of the core-band, because the mobile stations would not receive all of the necessary broadcast channel information, preventing those stations from switching to a full bandwidth state of operation**."

Ex. D to Dkt. 194, IPR2015-01664, Final Written Decision at 15-16.

Defendants' Construction Comes from IV's Own Words

- The PTAB accepted IV's construction based on IV's arguments regarding the purpose of transmitting a broadcast channel in the core-band:

> "Upon further review of the '431 patent, **particularly in view of Patent Owner's arguments supported by Dr. Zeger's testimony discussed above**, we are persuaded that . . . to show that the transmitting 'a broadcast channel in an OFDMA core-band limitation is met, Petitioner must demonstrate that the prior art teaches or suggests transmitting a broadcast channel, wherein **the entire** channel is contained **within** the core-band.'"

Ex. D to Dkt. 194, IPR2015-01664, Final Written Decision at 15-16.

Defendants' Construction is IV's Explanation of the "Entire" Broadcast Channel

"The '431 Patent explains that **the purpose of transmitting a broadcast channel in a core-band is to provide essential radio control channels and a set of data channels in a core-band to maintain basic radio operation**"

Ex. E to Dkt. 194, IPR2015-01664, Patent Owner Response at p. 36

"transmit a broadcast channel, wherein the entire broadcast channel is contained within the OFDMA core band and **provides essential radio control channels and a set of data channels in the core band to maintain basic radio operation**"

Defendants' Construction

IV's Reply Does Not Dispute the Majority of Defendants' Construction

- IV's opening brief ignored the meaning of the "entire broadcast channel"
- IV's Reply does not dispute that the "broadcast channel" "within the core-band" must be one that **provides essential radio <u>control</u> channels in the core band to maintain basic radio operation**
- IV's dispute: whether the broadcast channel also must (as IV represented to the PTAB) "provide . . . **a set of data channels** in the core band to maintain basic radio operation"

IV's Reply Argument is a Straw Man

- IV argues that there is not support for data channels that are "contained within" a broadcast channel
- But IV raises an argument that no one is advocating here
- Defendants' construction (using IV's own language) is that the broadcast channel "**provides** essential radio control channels and a set of data channels in the core band to maintain basic radio operation"
    - For example, the broadcast channel in the core band can contain control channels that provide the addresses of the data channels within the core band
        - The portion of the specification cited by IV in the IPR for the alleged "purpose of transmitting the broadcast channel in the core band" describes that exactly

The Portion of the Specification Cited by IV in the IPR Supports this Construction

"The '431 Patent explains that **the purpose of transmitting a broadcast channel in a core-band is to provide essential radio control channels and a set of data channels in a core-band to maintain basic radio operation. Ex. 1001 ['431 Patent] at 5:8-13.**"

Ex. E to Dkt. 194, '431 Patent IPR Patent Owner Response at 36

"In one embodiment relevant or essential radio control signals such as preambles, ranging signals, bandwidth request, and/or **bandwidth allocation** are transmitted within the CB. In addition to the essential control channels, **a set of data channels and their related dedicated control channels are placed within the CB to maintain basic radio operation**."

'431 Patent at 5:8-13 and '641 Patent at 5:7-12

"transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band"

- "transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band"

Claim 1

The Correct Construction

"transmit a broadcast channel, wherein the entire broadcast channel is contained within the OFDMA core band and provides essential radio control channels and a set of data channels in the core band to maintain basic radio operation"

- IV does not dispute: The broadcast channel in the core band must include essential radio control channels to maintain basic radio operation
- IV's own language resulting in this construction confirms that the broadcast channel in the core band must provide essential radio control channels and a set of data channels in the core band to maintain basic radio operation